

What is claimed is:

1. A method for generating stereoscopic images,
5 comprising the steps of:
 - converting, of objects made of polygons having 3D coordinates, object data to be displayed in a planar view to reference camera coordinate system data with its origin at a reference camera and converting object data to be
 - 10 displayed in a stereoscopic view to parallax camera coordinate system data for right and left eyes respectively with their origins at parallax cameras for right and left eyes having predetermined parallax angles;
 - 15 drawing the reference camera coordinate system object data and the parallax camera coordinate system object data for right eye as image data for right eye in a video memory;
 - 20 drawing the reference camera coordinate system object data and the parallax camera coordinate system object data for left eye as image data for left eye in the video memory; and
 - 25 synthesizing the image data for right and left eyes drawn in the video memory and displaying, on a stereoscopic display device, images mixing stereoscopic and planar objects.

2. The method for generating stereoscopic images

according to claim 1, wherein the objects to be displayed in a planar view are objects having their image formation positions outside a stereoscopic viewable range of the stereoscopic display device in a 3D coordinate space.

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3. A method for generating stereoscopic images, comprising the steps of:

converting object data made of polygons having 3D coordinates to parallax camera coordinate system data respectively with their origins at parallax cameras for right and left eyes having predetermined parallax angles;

10 performing scaling using the converted parallax camera coordinate system data to compress coordinates of the parallax camera coordinate system data in the direction of the depth of a stereoscopic viewable range of a stereoscopic display device such that all the objects have their image formation positions within the stereoscopic viewable range;

15 drawing the scaled parallax camera coordinate system data in a video memory; and

20 displaying, on the stereoscopic display device, drawing data drawn in the video memory.

4. A method for generating stereoscopic images, comprising the steps of:

25 converting object data made of polygons having 3D coordinates to parallax camera coordinate system data

respectively with their origins at parallax cameras for right and left eyes having parallax angles;

narrowing the parallax angles during conversion to the parallax camera coordinate system data such that all 5 objects of the parallax camera coordinate system data to be converted have their image formation positions within a stereoscopic viewable range of a stereoscopic display device; and

displaying, on the stereoscopic display device, the 10 converted parallax camera coordinate system data at the narrowed parallax angles.

5. A method for generating stereoscopic images, comprising the steps of:

15 converting object data made of polygons having 3D coordinates to reference camera coordinate system data with its origin at a reference camera;

converting, of object data converted to the reference camera coordinate system data, object data to be displayed 20 in a stereoscopic view to parallax camera coordinate system object data respectively with their origins at parallax cameras for right and left eyes having predetermined parallax angles;

drawing the reference camera coordinate system 25 object data and the parallax camera coordinate system object data for right eye as image data for right eye in a video memory;

drawing the reference camera coordinate system object data and the parallax camera coordinate system object data for left eye as image data for left eye in the video memory; and

5 synthesizing the image data for right and left eyes drawn in the video memory and displaying, on a stereoscopic display device, images mixing stereoscopic and planar objects.

10 6. The method for generating stereoscopic images according to claim 5, wherein the objects to be displayed in a planar view are objects having their image formation positions outside a stereoscopic viewable range of the stereoscopic display device in a 3D coordinate space.

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7. A method for generating stereoscopic images, comprising the steps of:

20 converting object data made of polygons having 3D coordinates to reference camera coordinate system data with its origin at a reference camera;

 generating, from the reference camera coordinate system data, parallax camera coordinate system data respectively with their origins at parallax cameras for right and left eyes having parallax angles;

25 performing compression scaling during generation of the parallax camera coordinate system data such that all objects have their image formation positions within a

stereoscopic viewable range of a stereoscopic display device;

 drawing the parallax camera coordinate system data for right and left eyes in a video memory; and

5 synthesizing the image data for right and left eyes drawn in the video memory and displaying the data on the stereoscopic display device.

8. A method for generating stereoscopic images,

10 comprising the steps of:

 converting object data made of polygons having 3D coordinates to reference camera coordinate system data with its origin at a reference camera;

15 converting the reference camera coordinate system data to parallax camera coordinate system data respectively with their origins at parallax cameras for right and left eyes having parallax angles;

20 narrowing the parallax angles during conversion to the parallax camera coordinate system data such that all objects of the parallax camera coordinate system data to be converted have their image formation positions within a stereoscopic viewable range of a stereoscopic display device; and

25 displaying, on the stereoscopic display device, the converted parallax camera coordinate system data at the narrowed parallax angles.

9. The method for generating stereoscopic images according to any one of claim 1, wherein the parallax angles of the parallax cameras are adjustable in real time by operations of an observer.

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10. The method for generating stereoscopic images according to claim 9, wherein the parallax angles are continuously and gradually varied as a result of the adjustment by operations of the observer.

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11. An apparatus for generating stereoscopic images, comprising:

a geometry unit for converting object data made of polygons having 3D coordinates to reference camera coordinate system data with its origin at a reference camera and converting, of objects converted to the reference camera coordinate system data, object data to be displayed in a stereoscopic view to parallax camera coordinate system data respectively with their origins at parallax cameras for right and left eyes having predetermined parallax angles;

a video memory for drawing the reference camera coordinate system object data and the parallax camera coordinate system object data for right eye as image data for right eye and further drawing the reference camera coordinate system object data and the parallax camera coordinate system object data for left eye as image data

for left eye; and

a rendering unit for synthesizing the image data for right and left eyes drawn in the video memory, wherein a stereoscopic display device is provided that displays 5 images mixing stereoscopic and planar objects using image data for right and left eyes synthesized by the rendering unit.

12. An apparatus for generating stereoscopic images,

10 comprising:

a geometry unit for converting object data made of polygons having 3D coordinates to reference camera coordinate system data with its origin at a reference camera and generating, from the reference camera 15 coordinate system data, parallax camera coordinate system data respectively with their origins at parallax cameras for right and left eyes having parallax angles; and

a stereoscopic display device for displaying an image made by synthesizing images for right and left eyes 20 generated from the parallax camera coordinate system data for right and left eyes, wherein

the parallax camera coordinate system data is scaled during generation of the parallax camera coordinate system data from the reference camera coordinate system data by 25 the geometry unit such that all objects have their image formation positions within a stereoscopic viewable range of the stereoscopic display device.

13. An apparatus for generating stereoscopic images, comprising:

a geometry unit for converting object data made of
5 polygons having 3D coordinates to reference camera coordinate system data with its origin at a reference camera and generating, from the reference camera coordinate system data, parallax camera coordinate system data respectively with their origins at parallax cameras
10 for right and left eyes having parallax angles; and
a stereoscopic display device for displaying an image made by synthesizing images for right and left eyes generated from the parallax camera coordinate system data for right and left eyes, wherein
15 the parallax angles are set during generation of the parallax camera coordinate system data from the reference camera coordinate system data by the geometry unit such that all objects have their image formation positions within a stereoscopic viewable range of the stereoscopic
20 display device.

14. The apparatus for generating stereoscopic images according to any one of claim 11, wherein an input unit is further provided, and wherein the camera parallax angles are adjusted in real time by the geometry unit according to a parallax adjustment signal input from the input unit in correspondence with operations of the

observer.

15. The apparatus for generating stereoscopic images according to claim 14, wherein the parallax angles are
5 continuously and gradually varied as a result of the parallax angle adjustment.

16. A storage medium for storing a program run in an apparatus for generating stereoscopic images, the
10 apparatus being provided with a geometry unit for converting coordinates of object data made of polygons having 3D coordinates and with a stereoscopic display device for displaying model data that has been subjected to the coordinate conversion, the program including the
15 steps of:

allowing the geometry unit to convert, of the objects, object data to be displayed in a planar view to reference camera coordinate system data with its origin at a reference camera and convert object data to be displayed in a stereoscopic view to parallax camera coordinate system data respectively with their origins at parallax cameras for right and left eyes having predetermined parallax angles;

20 drawing the reference camera coordinate system object data and the parallax camera coordinate system object data for right eye as image data for right eye in a video memory;

drawing the reference camera coordinate system object data and the parallax camera coordinate system object data for left eye as image data for left eye in the video memory; and

5 synthesizing the image data for right and left eyes drawn in the video memory and displaying, on a stereoscopic display device, images mixing stereoscopic and planar objects.

10 17. The storage medium for storing a program according to claim 16, wherein the objects to be displayed in a planar view are objects having their image formation positions outside a stereoscopic viewable range of the stereoscopic display device in a 3D coordinate space.

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18. A storage medium for storing a program run in an apparatus for generating stereoscopic images, the apparatus being provided with a geometry unit for converting coordinates of object data made of polygons 20 having 3D coordinates and with a stereoscopic display device for displaying model data that has been subjected to the coordinate conversion, the program including the steps of:

allowing the geometry unit to convert the object data 25 to parallax camera coordinate system data respectively with their origins at parallax cameras for right and left eyes having predetermined parallax angles;

performing compression scaling of the converted parallax camera coordinate system data in the direction of the depth of a stereoscopic viewable range of the stereoscopic display device such that all the objects have
5 their image formation positions within the stereoscopic viewable range;

drawing the objects that have been subjected to compression scaling as image data for right and left eyes in a video memory; and

10 synthesizing the image data drawn in the video memory and displaying the data in a mixture on the stereoscopic display device.

19. A storage medium for storing a program run in an apparatus for generating stereoscopic images, the apparatus being provided with a geometry unit for converting coordinates of object data made of polygons having 3D coordinates and with a stereoscopic display device for displaying model data that has been subjected
15 to the coordinate conversion, the program including the steps of:

allowing the geometry unit to convert the object data to parallax camera coordinate system data respectively with their origins at parallax cameras for right and left
25 eyes having parallax angles;

narrowing the parallax angles such that all objects of the parallax camera coordinate system data to be

converted have their image formation positions within a stereoscopic viewable range of the stereoscopic display device; and

5 displaying, on the stereoscopic display device, the converted parallax camera coordinate system data at the narrowed parallax angles.

20. The storage medium for storing a program according to any one of claim 16, wherein the parallax angles of the 10 parallax cameras are adjustable in real time by operations of an observer.

21. The storage medium for storing a program according to claim 20, wherein the parallax angles are continuously 15 and gradually varied as a result of the adjustment by operations of the observer.